



We love Meat....



....but that love is slowly turning into a fatal attraction



feed

6.7

Pounds of
grains and forage



water

52.8

Gallons for drinking water
and irrigating feed crops



land

74.5

Square feet for grazing
and growing feed crops



fossil fuel
energy

1,036

Btus for feed production and
transport. That's enough to power a
typical microwave for 18 minutes.



And that's not all.....

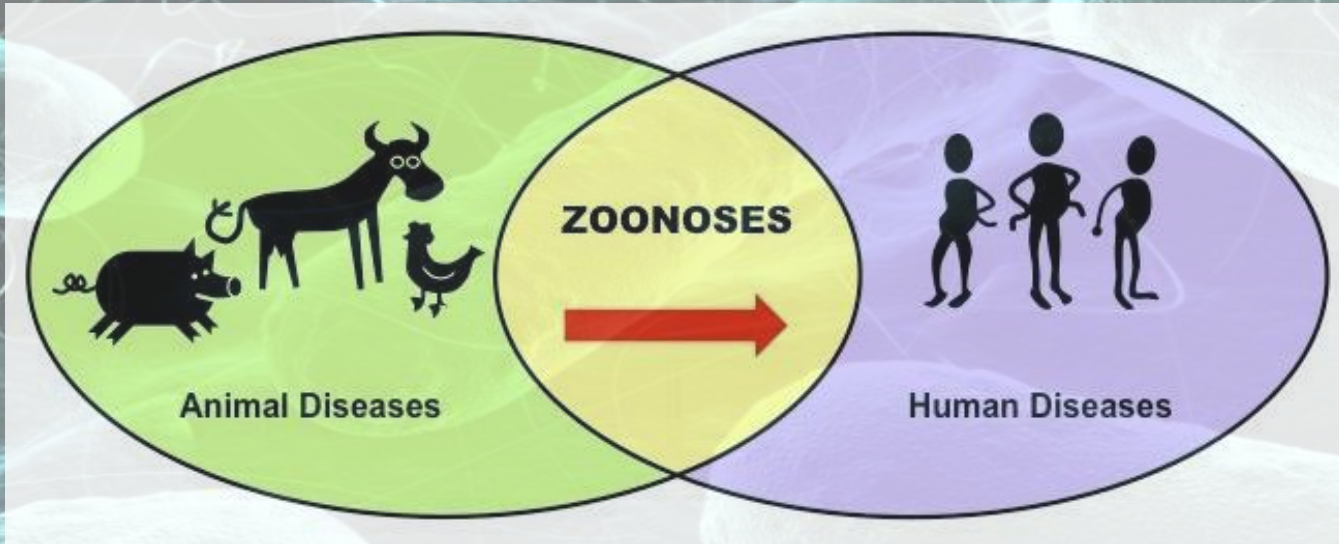


And that's not all.....



Big, bigger, biggest.....





Global meat demand estimated to increase 70% by 2050

More income? More meat!



Google searches for 'Vegan' globally 6x in 10 yrs



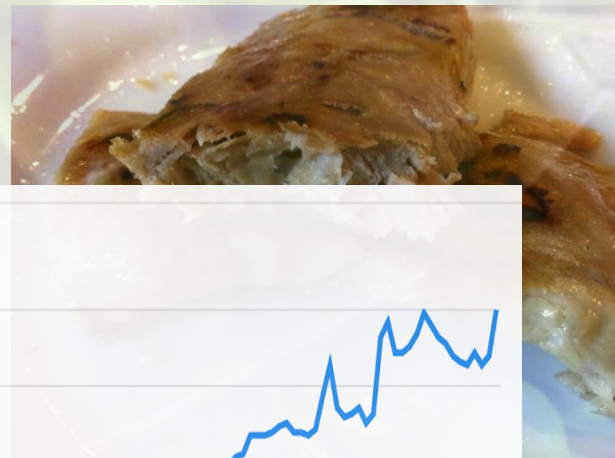
- 1.825.517 wild caught fish
- 115.124 chickens
- 71.515 farmed fish
- 5.434 ducks
- 2.732 pigs
- 2.205 rabbits
- 1.293 geese
- 1.163 turkeys
- 1.010 sheep
- 825 goats
- 562 cattle
- 132 rodents
- 112 pigeons and other birds
- 49 buffalo
- 9 horses
- 6 donkeys and mules
- 6 camels and other camelids



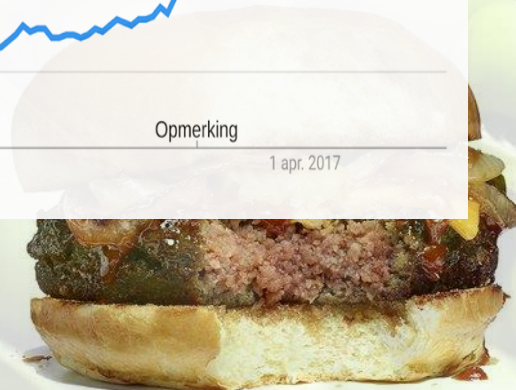


WHAT
CAN WE
DO

(Some) meat substitutes are closing in on the meat experience....



2010



2017

1980

BEYOND MEAT IN 27,000 LOCATIONS U.S.,
AND 50 COUNTRIES WORLDWIDE



**BEYOND
MEAT**

**THE BEYOND
BURGER**

**PLANT-BASED
BURGER PATTIES**

20G OF PLANT
PROTEIN
PER SERVING

**NO SOY
NO GLUTEN
GMO FREE**

See nutrition facts for fat and saturated fat content



PERISHABLE: KEEP REFRIGERATED **V**

TWO - 1/4LB PATTIES • NET WT. 8 OZ (227 g)

USE-BY DATE:

IMPOSSIBLE BURGER AVAILABLE IN 3.000+ LOCATIONS.
RECEIVED >\$450M FUNDING



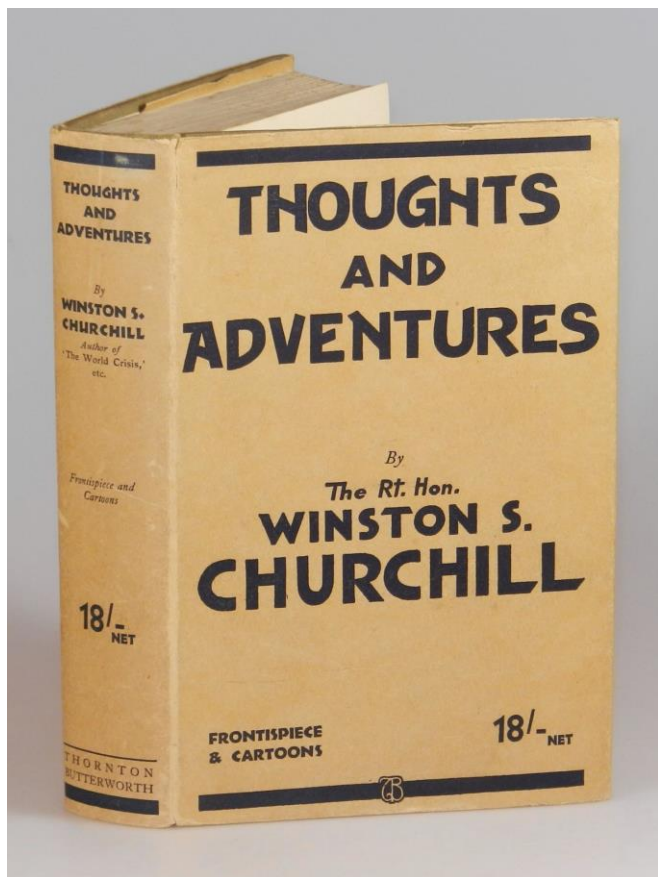
....but their market size is still modest compared to “real” meat



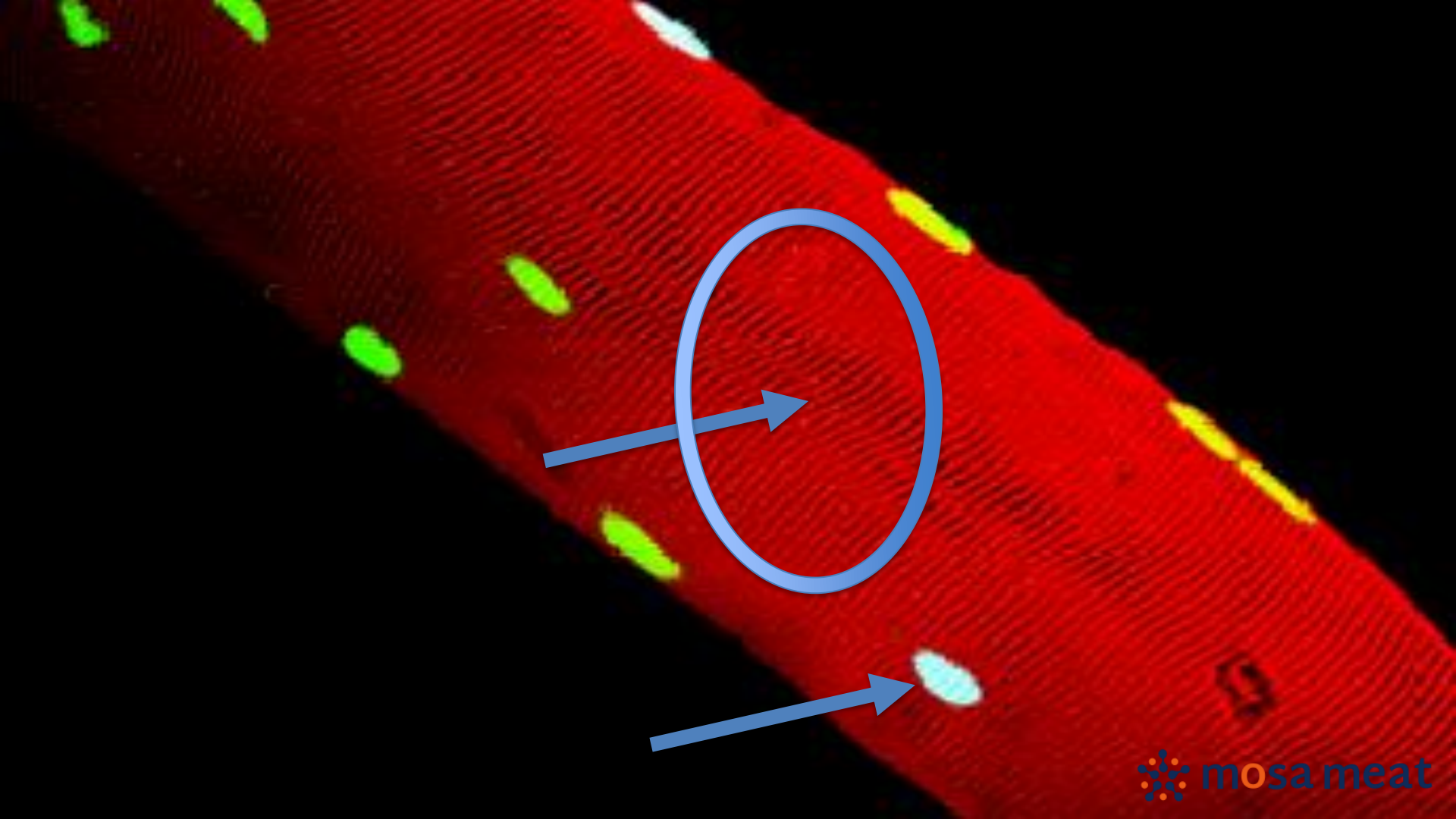
Tissue Engineered meat: the animal bypass



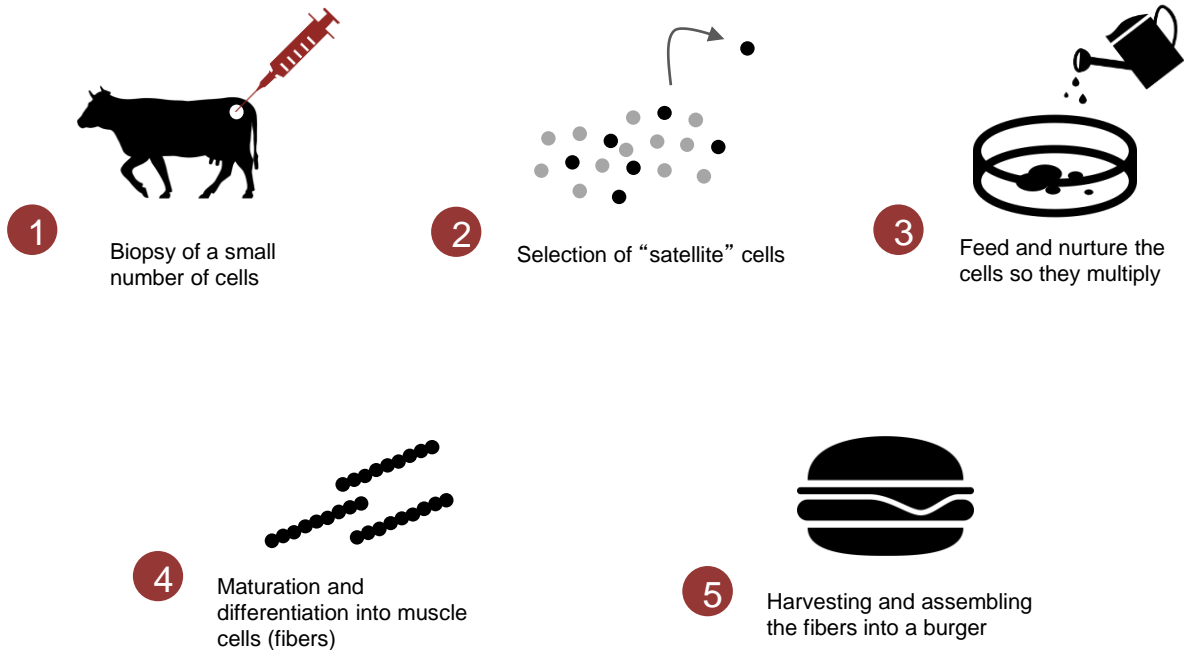
Winston Churchill, 1932

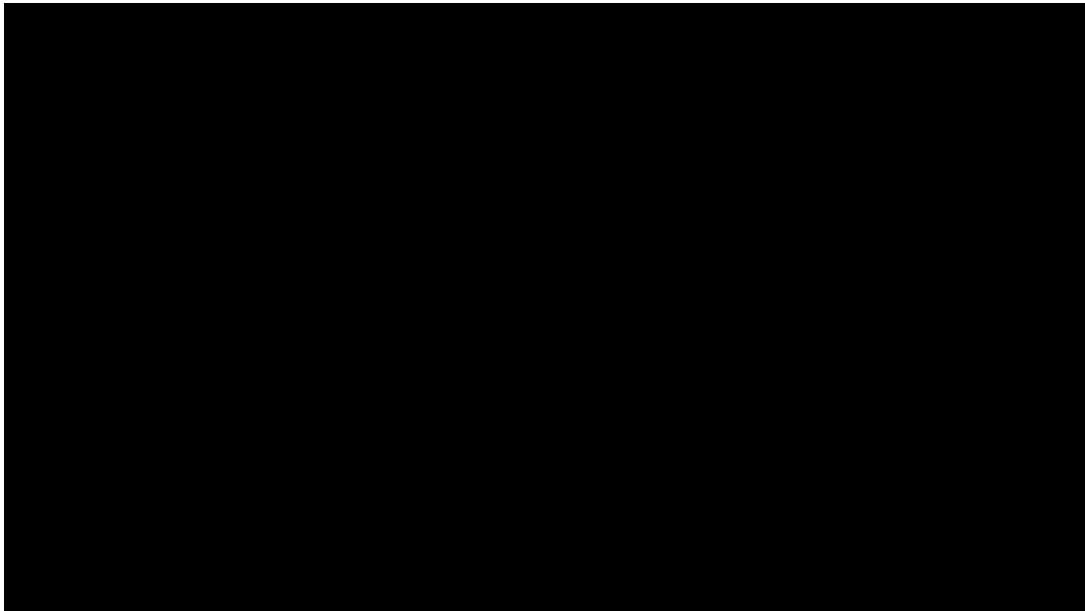


INSANE



How does it work?





It is still work in progress!



The path to industrialization

- Science
- Scale
 - Process design
 - Supply chain
 - COG
- Product formulation
- Regulation
- Consumer acceptance

ALL NATURAL*
**LEAN
GROUND BEEF**

CARNE MOLIDA DE RES, MAGRA

*MINIMALLY PROCESSED NO ARTIFICIAL INGREDIENTS

TO FREEZE: For best results, remove from original package and rewrap in freezer wrap or foil.

**COOK
TO:
160°F
MINIMUM**



Keep Refrigerated



DISTRIBUTED BY:
TSD SALES AND DISTRIBUTION
DAKOTA DUNES, SD 57049 U.S.A.

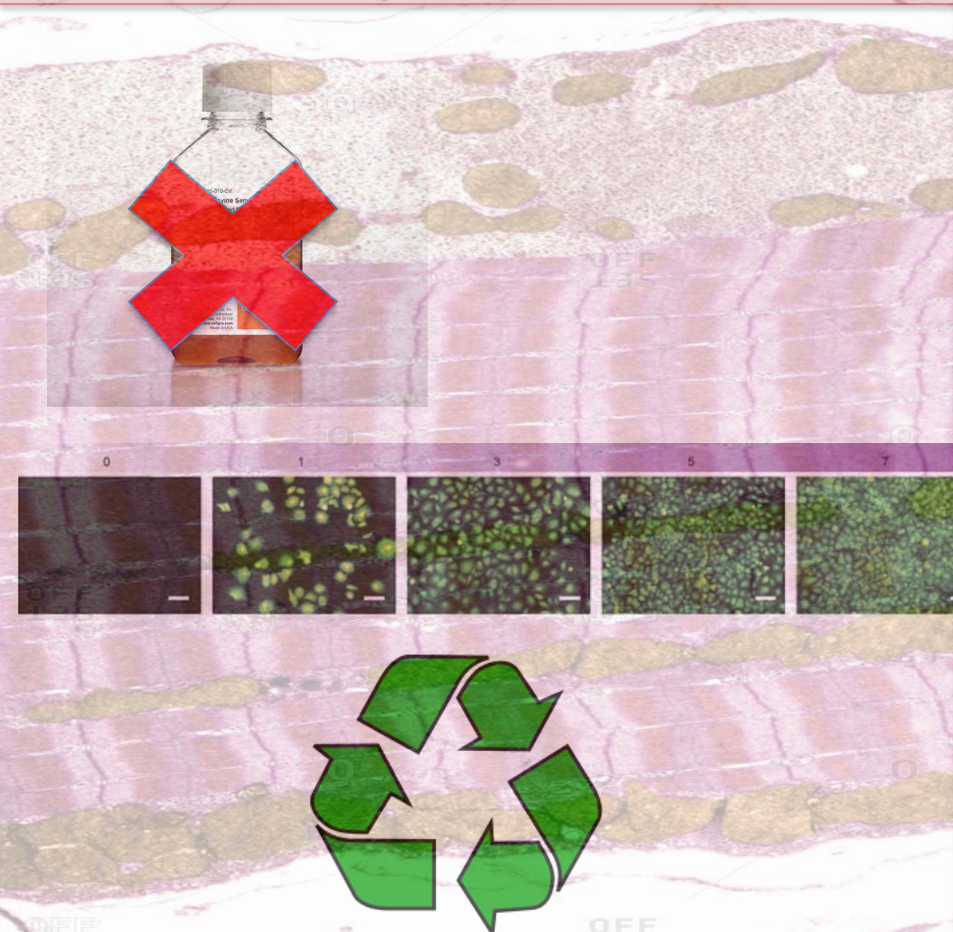


NET WT. 16 OZ. (1LB.)

R2302c

Science

Cell production



Tissue production



Scaling production (1): the hardware

Cell production

Tissue production



BIG



Scaling production (2): Make cell feed

Build a new industry



80% of meat production price

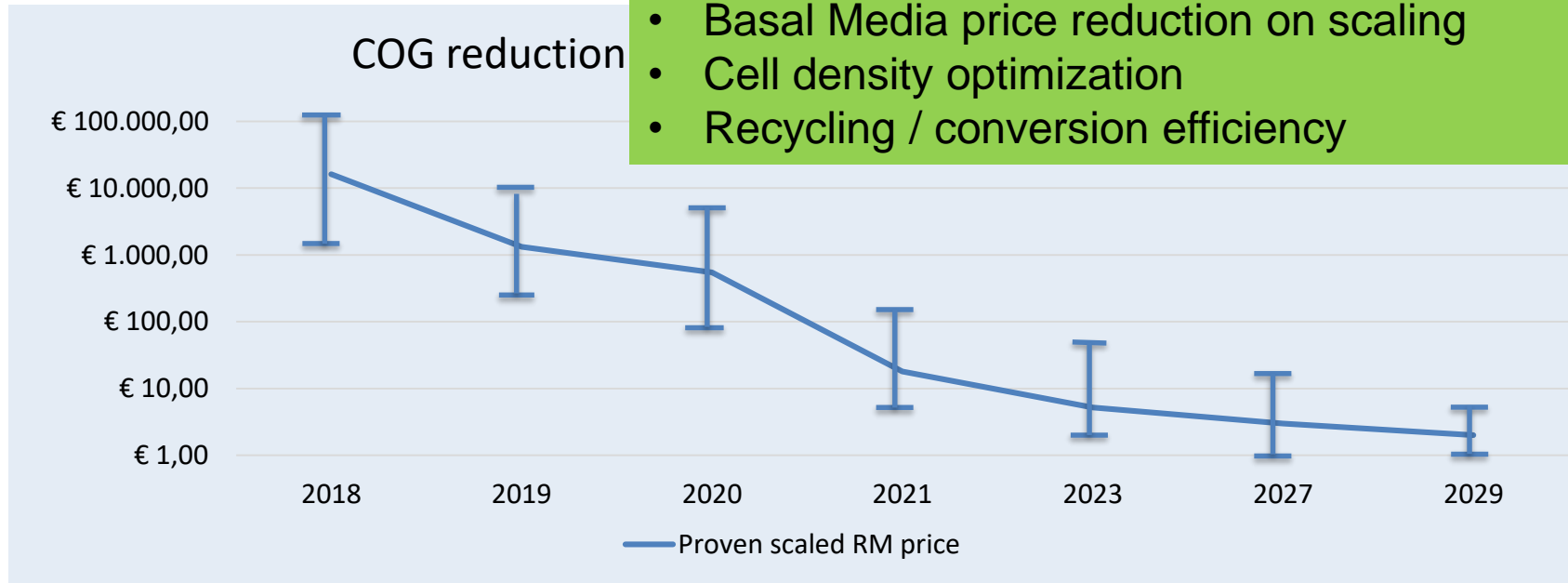
No Supply Chain (yet)

Scaling Growth factor
production

COG

Main factors

- GF price reduction on scaling
- Basal Media price reduction on scaling
- Cell density optimization
- Recycling / conversion efficiency



- Cells or tissue (or in between....)?



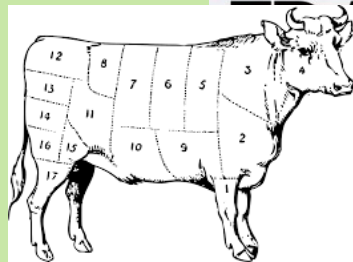
- Hybrid or not?



- GMO or not?

SHOCKING NEWS:

LOVES SALMON



© iStock.com / wildqthia

- Cell source?

- Revised Novel Food Procedure as of Jan. 2018
- Mosameat → EC → **EFSA** → EC (PAFF) → legislation
- Build dossier & submit
 - Safety **and** nutrition (Iron, B12, protein content)
 - Growth factors
 - Scale of sample batch production **must** be representative for large scale
 - *After submission* 18 months plus “question time”
- EC decision: room for “politics” (Qualified Majority / PAFF)

>50%



Trust



Cultural and social function

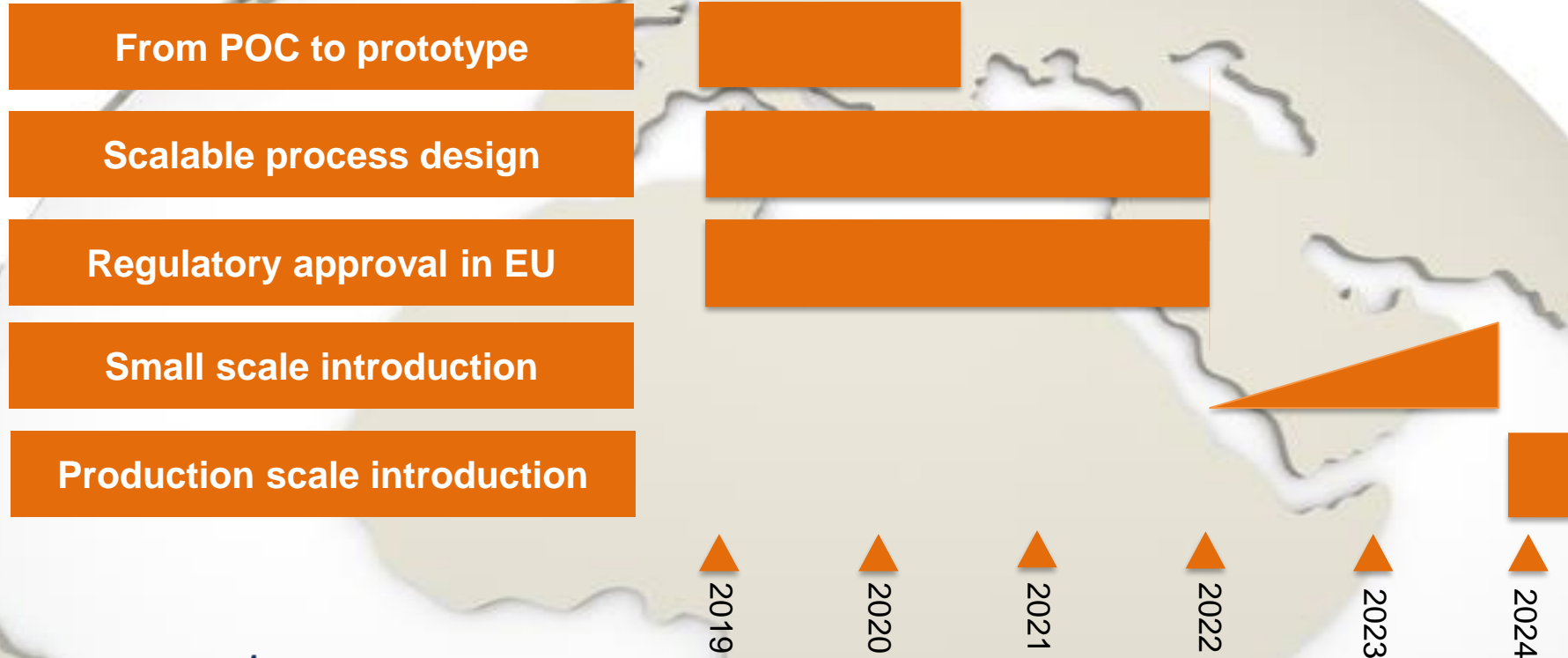


So....what's next?

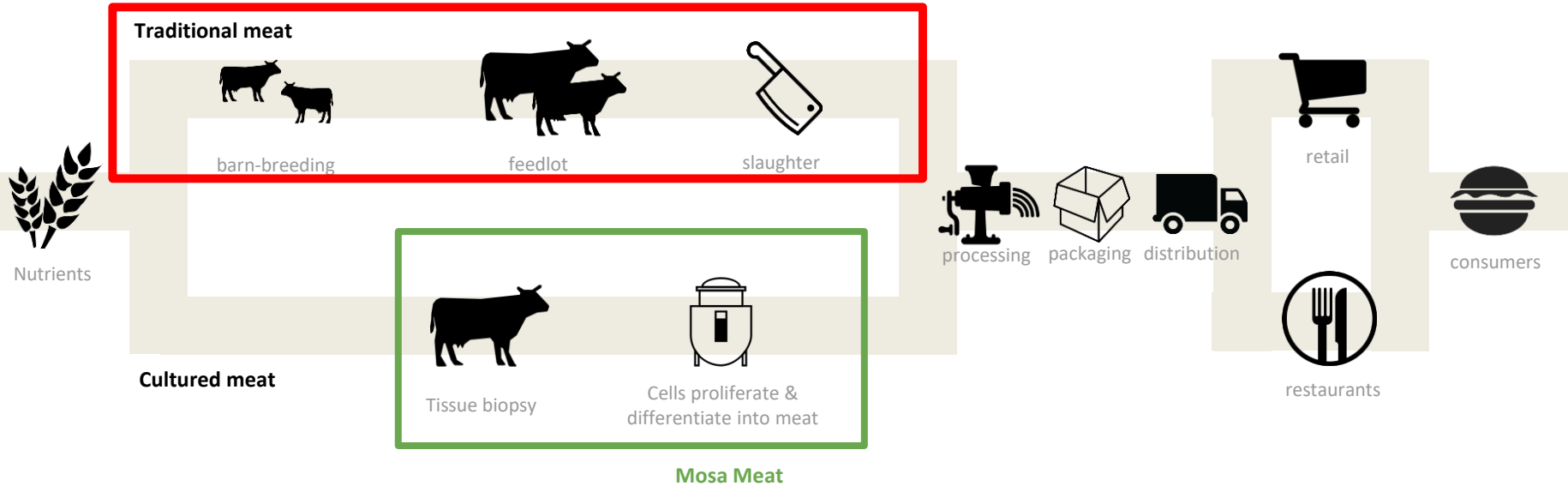


 mosa meat

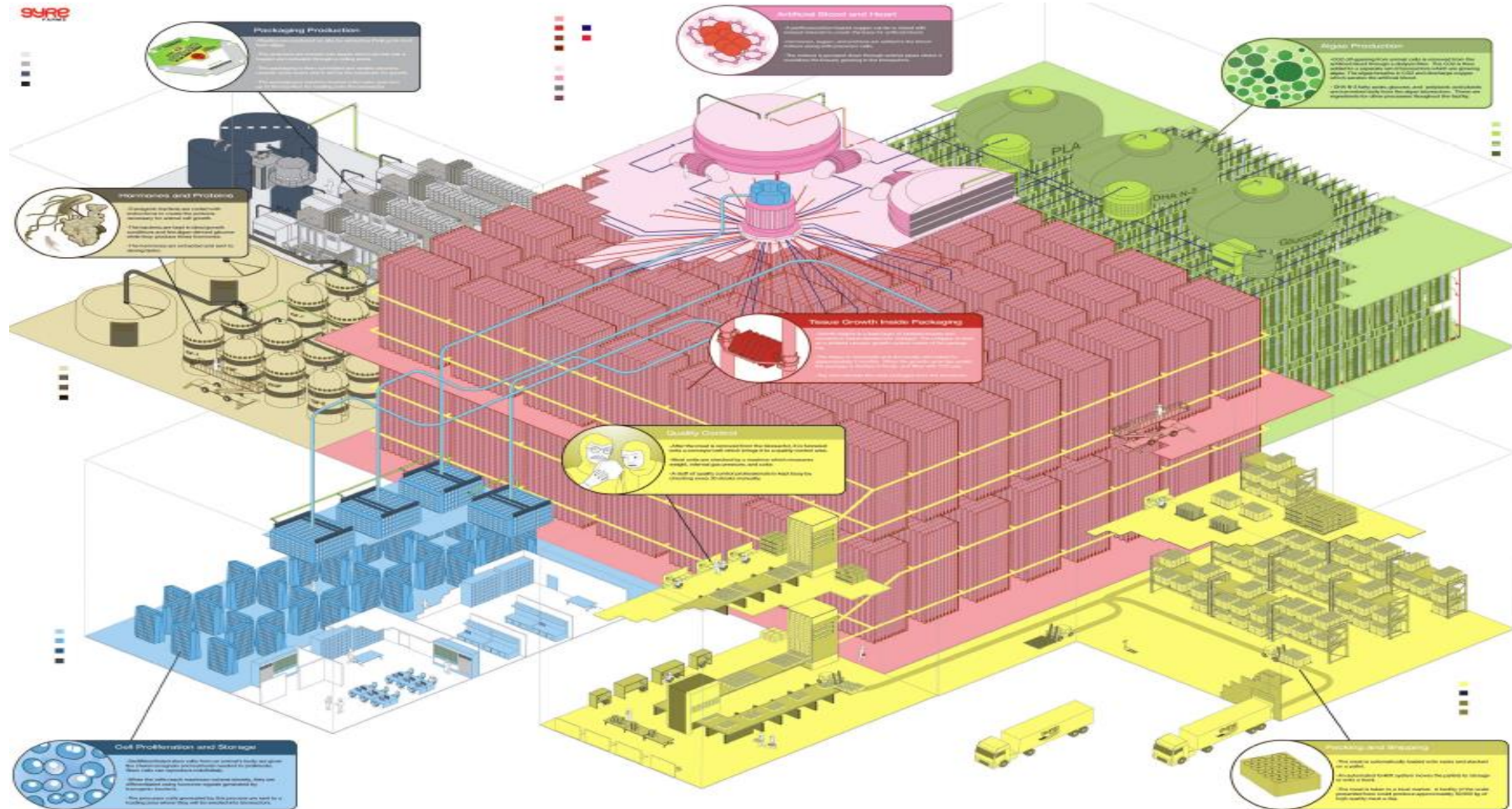
Pre- go to market activities, timing & milestones



MOSA MEAT IN THE VALUE CHAIN



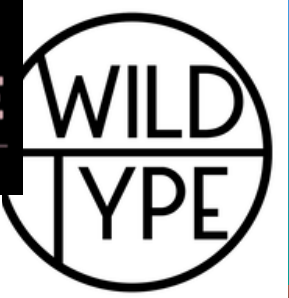
Meat production 2030?



We're not alone.....



Clear Meat



No really, we're not alone.....

The New Protein Industry V. 2.7

The Plant-Based Protein & Dairy Show
Amsterdam, August 26-28 2019

www.kindearth.tech

CREATING NEW PROTEIN

BIO-ENGINEERED PROTEIN 3D PRINTED NOVA MEAT, redefine meat, SavorEat BEEF Meatable, FM Technologies, ALEPH, mossa meat, CELL FARM, APPLETON MEATS, biftek.co PORK NEW AGE MEATS, FORK & GOODE, HS		SEAFOOD FUTURE FIELDS, Clean Research, BlueNalu, UShiok Meats, SEAFUTURE, Finless Foods, POUFLRY, SuperMeat, Clear Meat, FOIE GRAS, Integriculture, Supreme PEACE	MULTI JU: Eggs, Beef, Pork, ST Poultry, Seafood MISSION: Beef, Poultry, Pork, Seafood MEMPHIS: Beef, Pork, MEATS V: Pork, Kangaroo OTHER: CUBIC FOODS, GELTOR, novacca, WILD EXHA, BECAUSE ANIMALS, EGGS, Clara Foods, BioscienceZ, MILK, Perfect Day, LEGENDARY FOODS, New Culture	PLANT-BASED PROTEIN FIELD ROAST, garden, GARDEN OF EDELWEISS, Garden Gourmet, GOLD&GREEN, GRANAROLO, GUSTO, HEARTBEST, Hügli HARIAGE, HERITAGE heira, HILARYS, How On Earth VEGAN, Hungry Planet, IMPOSSIBLE, JACKFRUIT, Lightlife LIFE3, LIKE MEAT, Luma, maika, MIGHTY-MEAT, moonmeal, MorningStar, MyBy, NATURINNI, NATURLI, neat, Nestlé New Wave Foods, NO COW, NO EVIL, NotCo, nutrition & nature, OCEAN HUGGER FOODS, Ojai, OLICK, M.D. OUMPHI Pflanze planted, PLANT POWER, POLSKA FOODS, Right (treat), ROPAL, RILBITE, samhoud, schouten, Seamedy, Sophie's s p e r o, Soly, Tofurky, Tyson, unisby, UNMEAT, UNREAL, smithfield foods, UPTON, VEGAN, VEGANT, VEGAN CARTEL hilcona, Vegest, Veggie life, vegini, VEGUSTO, VIVERA, Wessanen, WORTHINGTON, YVES, alpha, MIF, BEFORE, BUTCHER BETTER MEAT, DARING, FEBUD, GOOD GOOD, GOOD, URBAN, WOOD, YORAY, JERKY, JERKY, VEGIC, JU, LOVE, STAR, MOVING, MOUNTAINS
		ALGAE-BASED PROTEIN akua, ALGAMA, alver, Caviart, IKEA, ODONTELLA		
		FUNGI B!AF, JEWELS OF THE FOREST, Drop Foods, MOKU, MOVING MOUNTAINS, Nulcase, Nuxos, Outstanding, P, Quorn, SELTA, Terramino Foods, WILD EXHA		

INGREDIENTS*

AAK, ABCROOS, ADM, Aji, ALGAMA, Amäi, Algorithm, AOT, ARBIOM, Avebe, AVril, Axiom, Back of the Yards, Algae Sciences, 3FBi, beno, Ballelic Foods, BioscienceZ, Biomimetic, Burcon, Cargill, CALYSTA, CHICKP, CHR, HANSEN, Corbion, cosucra, Deep Branch, CRESPEL & DEITERS, DUPLACO, DSM, EMSLAND GROUP, ecovative, EQUINOM, FIRMENICH, FUJUI OIL, FUMI INGREDIENTS, FLAVORCAN, GINKGO BIOWORKS, Givaudan, Glica, GreenFood50, Hydrosol, Glanbia, HINOMAN, HIFOOD, Inalve, INVIVO, IFF, INNOVOPRO, Ingredion, Improved Nature, JVA, JETRAL, KERRY, Kumbi, Kiverdi, LESAFFRE, LEKITHOS, LENTEIN, MAGELLAN, MANE, meatless, MIGHTY-MEAT, MushLabs, MYOBEL, MYCORENA, MycoTechnology, MYCOWORKS, NATUREX, NEW, novacca, novonutrients, NutraNovo, Nutress, NUTRIATI, plantible, PEVESEA, MD, PLANTLX, phycom, protera, PROLYSIN, PURIS, ROQUETTE, RUITENBERG, SOLARFOODS, SALT OF THE EARTH, SOTEXPRO, SOUSSANA, Spira, symrise, Synthesace, Superaltern, TATE & LYLE, Tereos, Tervivo, The Lupin Co., TRITON, Vestkorn, wilmar

TMRW FOODS, IFC, CHINGOIA BIOWORKS, DUPONT, EMERGENCY LABS, WIL, ALKION INNOVATIONS, reblough, FROEY FOODS

* (FLAVORS, COLORS, FILLERS, CASINGS...)

SUPPORTING NEW PROTEIN

MANUFACTURING AGULOS, Bio Base Europe, VERBUFA BIOREALIZE, BLACK&VEATCH, BRECKS, MD, BUHLER, CLEXTAL, CNOPY, copersion, omve EXTRACTIS, IMPROVE, PAN, BIOTECH, Nove foods, ThermoFisher, RASBLUMOS, SUNP BIOTECH, μFraction, WENGER, VAN HEES, SOURCE TECHNOLOGY	INCUBATORS BIG IDEA VENTURES, BITS×BITES, BLU1877, brinc, FOOD-X, Food, FoodFORWARD, INDIE BIO, Leave a Nest, ivoro, KITCHENTOWN, EVILAGE, MISTA, NOVA, OUTERMOST, PlantStation, PLUGANDPLAY, Reobio, StartUpbootcamp, Sparx, TERRA, The Kitchen, toasterlabs, wework labs, Combinator, PEARSE LYONS, ATLANTIC FOOD LABS, blue ocean, xlerator, Chobani, Incubator, EATABLE ADVENTURES, FORWARD FODDING, KICKSTART ACCELERATOR, OUTDOOR GREENHOUSE, PROVEG, SEEDS OF CHANGE, SHAKEUP FACTORY	NONPROFITS DIL, FAIRR, FIAL, food, FOOD FRONTIER, Hemp Food Association, PATH, ROSLINNIEJE, SHOJINMEAT, Mitozo, The Protein Cluster, BANGSH CLUSTER, NEW HARVEST, BETTER LEAFING, PLANT BASED FOOD ASSOCIATION, blue horizon foundation, PLANT JUSTICE, MATIAS, PROTEINES FRANCE, The Modern Agriculture Foundation, GOOD FOOD VEGAN SOCIETY, VEGETARIAN SOCIETY	RESEARCH & ACADEMIA KENT STATE UNIVERSITY OF TORONTO, CEFET-MG, CNTA, UNIVERSITY OF TORONTO, VTECHNION, TEL PUJI UNIVERSITY, THE HEBREW UNIVERSITY OF JERUSALEM, VTT, NC STATE UNIVERSITY, WAGENINGEN UNIVERSITY, WPI, Bath University, Maastricht University, THE UNIVERSITY OF MELBOURNE
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FUNDING NEW PROTEIN

VC FIRMS: SEED AGFUNDRA, BIG IDEA VENTURES, Capital, BITS×BITES, Cleveland Avenue, FOOD BUSINESS ANGELS, FTW VENTURES, GERMIN8, INDIEGOGO, Katjesgreenfood, Vessel, MD, powerplant, SOV, StrayDogCapital, Tyson Ventures, BABEL, Beyond Meat Ventures, CULTIVIAN SANDBOX, FIVE SEASONS VENTURES, GlassWall VENTURES, GOOD SEED VENTURES, NEW CROP CAPITAL, S2 VENTURES, The Next Branch, Unovis Partners, ViaVires New Protein	VC FIRMS: GROWTH BIG IDEA VENTURES, CAPITAL, Dao Ventures, evolvo, khosla ventures, Felicis Ventures, FOUNDERS FUND, Katjesgreenfood, korys, NP, G, DFJ, Horizons Ventures, ID CAPITAL, PeakBridge, TEMASEK, Tyson Ventures, ASIA BASE CAPITAL, blue horizon, green monday, KBV, NEW CROP CAPITAL, OBVIOUS VENTURES, S2 VENTURES, ViaVires New Protein, Vegon Capital, ViaVires New Protein	CORPORATE PARTNERS alberts, Campella, Cargill, DANONE, Dalco, DFDAO FOODS, Dean, DANISH CROWN, freedom, HILTON, Kellogg, KERRY, KraftHeinz, Kroger, LALA, MARS, Monde Nissin, MTG, Mondelez, neXtfoods, PEPSICO, P/H/W, ALDI, Nestlé, Sainsbury's, sodexo, SOGLOWEK, STARBUCKS, Rabobank, Strauss, TARGET, TESCO, Tyson, Unilever, Alpicco, Natural Foods, BELL FOOD GROUP, FROEY FOODS, General Mills, foods, MAPLE LEAF, WHOLE FOODS
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Cell-Ag is coming



It's people that start disruptions....not processes

“While the theoretical possibility of growing meat in an industrial setting has long captured the public imagination, it took decades for science to catch up with Van Eelens imagination”.

Paul Shapiro, Clean Meat (2018)

